

What I claim is:

1. An apparatus for natural recycling of protein waste comprising:
  - a) means for mixing an enzymatic digest medium and for adjusting its pH level;
  - b) a mobile grinding assembly mounted on a movable platform and comprising grinding means for protein waste and mixing means for combining said ground protein waste and said enzymatic digest medium to produce a protein solubles mixture;
  - c) means for digesting and emulsifying said protein solubles mixture;
  - d) a drying system comprising a dough mixing apparatus, an extruder, and a drying apparatus.
2. An apparatus for natural recycling of protein waste as claimed in claim 1 wherein said means for mixing an enzymatic digest medium comprises an enzymatic digest mixing assembly having at least one mixing tank, pumping means, a re-circulating assembly, and a pH adjustment assembly.
3. An apparatus for natural recycling of protein waste as claimed in claim 2 wherein said pumping means comprises a first centrifugal pump.
4. An apparatus for natural recycling of protein waste as claimed in claim 3 wherein said re-circulating assembly comprises a first inductor nozzle associated with said centrifugal pump and a return pipe for circulating the enzymatic digest medium.
5. An apparatus for natural recycling of protein waste as claimed in claim 4 wherein said pH adjustment assembly comprises:
  - a) a pH probe internal to said mixing tank;
  - b) a pH monitor associated with said pH probe;

c) a first positive displacement pump; and  
d) a supply of acidic solution fluidly connected to said first positive displacement pump and to said mixing tank through a check valve wherein said pH probe provides a pH level of said enzymatic digest medium to said monitor and said monitor compares said pH level to an optimal pH level and signals said first positive displacement pump to pump said acidic solution to said mixing tank until said optimal pH level is reached.

6. An apparatus for natural recycling of protein waste as claimed in claim 5 wherein said acidic solution is phosphoric acid.

7. An apparatus for natural recycling of protein waste as claimed in claim 6 wherein said acidic solution is lactic acid.

8. An apparatus for natural recycling of protein waste as claimed in claim 1 wherein said mobile grinding assembly further comprises:

- a) said movable platform having a front portion and a mid portion and a rear portion with a conveyor belt for transporting said protein waste mounted on said rear portion;
- b) a housing mounted on said mid portion;
- c) said housing encloses a power source, a holding tank for said enzymatic digest medium, at least one cone bottomed prep tank, and a centrifugal pump to move said enzymatic digest medium from said holding tank to said at least one cone bottomed prep tank;
- d) said grinding means comprises a grinder inlet positioned near said conveyor belt, a grinder plate, and a grinder outlet positioned to flow into a hydro pump with a lower outlet;

e) said mixing means comprises a second positive displacement pump fluidly connected to said at least one cone bottomed prep tank and said hydro pump to move said enzymatic digest medium to said hydro pump wherein said lower outlet of said hydro pump is fluidly connected to a suction side of a centrifugal chopper pump associated with said cone bottomed prep tank and with a re-circulation piping system and inductor nozzle such that said enzymatic digest medium and said ground protein waste can be mixed and continually re-circulated in said cone bottomed prep tank to form a protein solubles mixture.

9. An apparatus for natural recycling of protein waste as claimed in claim 1 wherein said means for digesting and emulsifying said protein solubles comprises:

a) a digester tank;

b) heating means comprising a heating element associated with said digester tank

c) re-circulation means comprising a centrifugal chopper pump fluidly associated with said digester tank through a re-circulation pipe and an inductor nozzle such that said protein solubles mixture in said digester tank can be heated and periodically re-circulated;

and

d) an emulsifier;

e) a separator tank;

d) said emulsifier fluidly connected to said digester tank such that digested protein solubles may be emulsified and then pumped into said separator tank;

e) said separator tank having a closeable opening fluidly associated with said enzymatic digest mixing tank allowing a water layer to be drained from said separator tank and recycled for use in said means for mixing an enzymatic digest medium.

10. An apparatus for natural recycling of protein waste as claimed in claim 9 wherein said digester tank comprises a cone bottom enclosed in a housing filled with fluid such that said heating element is positioned in said fluid to provide warmth to said digester tank and wherein said separator tank comprises a cone bottom in which said closeable opening is positioned.

11. An apparatus for natural recycling of protein waste as claimed in claim 1 wherein said dough mixing apparatus comprises:

- a) a volumetric feeder to deliver an absorbing carrier positioned over a mill for grinding said absorbing carrier;
- b) a high speed continuous mixer;
- c) a conveyor belt to move said absorbing carrier from said feeder to said high speed continuous mixer;
- d) a third positive displacement pump associated with said separator tank for moving emulsified protein solubles to said high speed mixer for producing a doughlike mixture.

12. An apparatus for natural recycling of protein waste as claimed in claim 1 wherein said extruder pressure-forces moisture out and produces a plurality of pellet-like pieces and an oscillating belt connects said extruder to said drying apparatus.

13. An apparatus for natural recycling of protein waste as claimed in claim 12 wherein said drying apparatus comprises:

- a) a dryer bed apron positioned to receive said dough pellet-like pieces from said oscillating belt;
- b) a housing through which a dryer bed conveyor belt moves;
- c) said housing having at least one heating zone, at least one cooling zone, and means to direct airflow to dehydrate said pellet-like pieces;
- d) a roller mill for sizing said plurality of pellet-like pieces to uniform size; and
- e) a vibrating screen to remove any said pellet-like pieces of non-uniform size.

14. An apparatus for natural recycling of protein waste comprising:

- a) an enzymatic digest mixing assembly comprising pumping means, a re-circulating assembly for mixing an enzymatic digest medium, and a pH adjustment assembly;
- b) a mobile grinding assembly;
- c) a digesting and emulsifying assembly comprising heating means, re-circulation means, and an emulsifier;
- d) means for extruding and drying digested and emulsified protein solubles.

15. An apparatus for natural recycling of protein waste as claimed in claim 14 wherein said pH adjustment assembly further comprises a pH probe internal to a mixing tank, a pH monitor associated with said pH probe, and a supply of acidic solution fluidly connected to a first positive displacement pump and to said mixing tank through a check valve wherein said pH probe provides a pH level of said enzymatic digest medium to said monitor and said monitor compares said pH level to an optimal pH level and signals said first positive displacement pump to pump said acidic solution to said mixing tank until an optimal pH level is reached.

16. An apparatus for natural recycling of protein waste as claimed in claim 15 wherein said acidic solution is phosphoric acid or lactic acid.

17. An apparatus for natural recycling of protein waste as claimed in claim 14 wherein said mobile grinding assembly comprises:

- a) a movable platform;
- b) a holding tank for said enzymatic digest medium;
- c) at least one prep tank;
- d) a pump to move said enzymatic digest medium from said holding tank to said prep tank;
- e) grinding means; and
- f) mixing means.

18. An apparatus for natural recycling of protein waste as claimed in claim 17 wherein said grinding means comprises a grinder inlet, a grinder plate, and a grinder outlet positioned such that its output flows into a hydro pump having a lower outlet and said mixing means comprises a second positive displacement pump connected to said at least one prep tank and said hydro pump such that said enzymatic digest medium can be moved to said hydro pump to be mixed with said output from said grinder outlet to produce a protein solubles mixture, said protein solubles mixture flowing into a suction side of a centrifugal chopper pump associated with said prep tank.

19. An apparatus for natural recycling of protein waste as claimed in claim 18 wherein said mixing means further comprises a recirculation piping system associated with said chopper pump, said prep tank, and an inductor nozzle placed within said prep tank.

20. An apparatus for natural recycling of protein waste comprising:

- a) means for mixing an enzymatic digest medium and adjusting its pH level;
- b) means for transferring said enzymatic digest medium to a mobile grinding assembly;
- c) said mobile grinding assembly mounted on a movable platform and comprising grinding means for protein waste and mixing means for combining said ground protein waste and said enzymatic digest medium to produce a protein solubles mixture;
- d) means for digesting and emulsifying said protein solubles mixture comprising a digesting and emulsifying assembly having recirculation means, heating means, and closed return piping fluidly associated with said means for mixing said enzymatic digest medium;
- e) means for transferring said protein solubles mixture from said mobile grinding assembly to said means for digesting and emulsifying said protein solubles mixture;
- and
- f) a drying system comprising a dough mixing apparatus, an extruder, and a drying apparatus.

21. An apparatus for natural recycling of protein waste as claimed in claim 20 wherein said means for mixing an enzymatic digest medium and adjusting its pH level includes a mixing tank with which are associated at least a pair of load cells and a digital scale to weigh an amount of preservative, an amount of inedible egg, an amount of enzyme and an amount of water to create said enzymatic digest medium.

22. An apparatus for natural recycling of protein waste as claimed in claim 20 wherein said drying apparatus comprises at least one heat zone and one cool zone and air flow is directed such that warmth exchanged in said cool zone is returned to one of said at least one heat zones.

23. An apparatus for natural recycling of protein waste as claimed in claim 20 wherein said grinding means comprises a grinder inlet positioned near a conveyor belt which delivers protein waste, a grinder plate, and a grinder outlet positioned to flow into a hydro pump with a lower outlet and said mixing means comprises a second positive displacement pump fluidly connected to at least one cone bottomed prep tank and said hydro pump to move said enzymatic digest medium to said hydro pump wherein said lower outlet of said hydro pump is fluidly connected to a suction side of a centrifugal chopper pump associated with said cone bottomed prep tank and with a re-circulation piping system and inductor nozzle such that there is no opening to ambient conditions other than that of said grinder inlet.